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Contents

Page

Family Overview

4

Module Data Sheets

Analog Input Modules

• NT-8101-HI-TX 8-channel AI, 4-20mA with HART for 2- or 4-wire	8
• NT-8103-AI-TX 8-channel AI, 4-20mA for 2- or 4-wire	9
• NT-8119-VI-05 8-channel Voltage Input, 1-5Vdc	10
• NT-8132-AI-UN 8-channel isolated AI, 4-20mA with HART, Thermocouple, RTD, Voltage	11
• NT-8105-TI-TC 4-channel THC/mV input	13
• NT-8106-TI-RT 4-channel RTD input	14

Analog Output Modules

• NT-8102-HO-IP 8-channel AO, with HART for 4-20mA	15
• NT-8104-AO-IP 8-channel AO, 4-20mA	16

Digital Inputs

• NT-8109-DI-DC 8-Channel DI, 24Vdc isolated, sinking	17
• NT-8110-DI-DC 8-channel DI, 24Vdc non-isolated, module powered	18
• NT-8121-DI-DC 16-channel DI, 24Vdc non-isolated, module powered	19
• NT-8122-DI-DC 16-channel DI, 24Vdc isolated, sinking	20
• NT-8111-DI-AC 8-channel DI, 115Vac isolated, sinking	21
• NT-8112-DI-AC 8-channel DI, 115Vac non-isolated, module powered	22
• NT-8113-DI-AC 8-channel DI, 230Vac isolated, sinking	23
• NT-8114-DI-AC 8-channel DI, 230Vac non-isolated, module powered	24

Digital Outputs

• NT-8115-DO-DC 8-channel DO, 2-60Vdc non-isolated, module powered	25
• NT-8117-DO-DC 8-channel DO, 2-60Vdc isolated, unpowered	26
• NT-8116-DO-AC 8-channel DO, 20-250Vac non-isolated, module powered	27
• NT-8118-DO-AC 8-channel DO, 20-250Vac isolated, unpowered	28

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Overview

The NovaTech 8000 Series I/O is the newest remote I/O family native to the D/3® Process Automation System (PAS). It is the preferred I/O for new installations and it can replace the older NovaTech 16000 series I/O in existing PCM cabinets, using existing field wiring connected to new termination panels with existing connectors.

With its -40 to +70° temperature range and G3 corrosive coating, the NovaTech 8000 Series I/O is an I/O system designed for field mounting. It connects to conventional and smart field devices through multi-channel I/O modules. The modules communicate, via a fast internal bus, with redundant Ethernet Bus Interface Modules (EBIMs) which provide dual-redundant high speed Ethernet data connections to the D/3®.

Up to 64 I/O modules can be supported within a single 8000 Series node, and each module has between 4 and 16 channels. An EthernetMPC card can support up to 50 nodes. With the availability of intrinsically safe modules, 8000 Series I/O provides a solution for both general purpose and hazardous area applications - even within the same node.

Designed for use with PCM 4100 or PCM 4200 PCI-based PCMs, it requires an Ethernet Multi Protocol Controller (EthernetMPC) card and D/3® version 12.2-2 or higher.

Key Features

- Wide range of input and output types, in any mix
- Up to 64 I/O modules per node
- Up to 50 nodes per EthernetMPC card
- Wide operating temperature range, -40 to +70°C
- General-purpose and intrinsically-safe I/O within a single node
- Redundant Local Area Networks (LAN) and power supplies supported
- High channel density
- Zone 2 and Division 2 hazardous area mounting as standard
- I/O module hot-swapping even in Zone 2 and Division 2
- HART® pass-through supported
- Rugged construction, optimized for true field mounting
- Integrated (per-channel) fusing and loop-disconnect facility
- Bussed field power on carriers eliminates daisy-chain wiring at field terminals
- Sophisticated mechanical keying system eliminates risk to plant and personnel

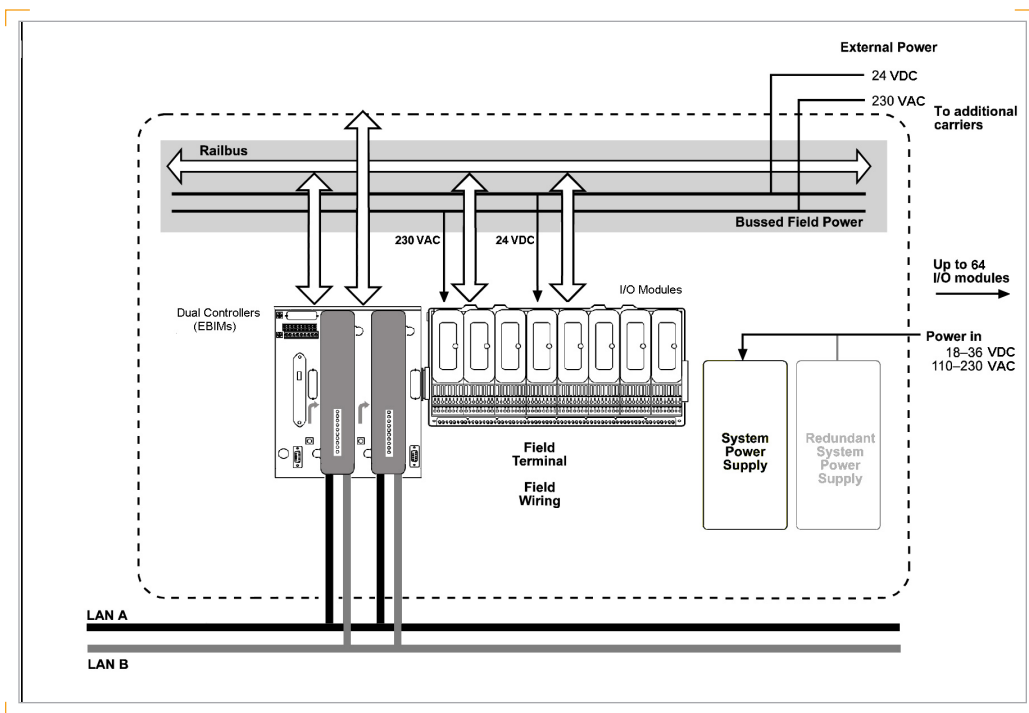
8000 Series connects to both conventional (such as 4-20mA) and smart field devices. It allows the cost benefits of fieldbus to be enjoyed with existing field instruments—ideal for plant upgrades and expansions. Pass-through of HART® information between HART® instruments and the D/3® network is possible.

8000 Series nodes can be located within, and connected into, a hazardous area where there is a risk of explosion from flammable gases. The standard, general purpose system is approved for operation in a Zone 2 or Class I, Division 2 hazardous area, with field devices in a similarly classified area. I/O modules with intrinsically safe field circuits can be connected to certified devices in Zone 0 and Class I, II, III, Division 1 hazardous areas.

Enclosures are also available for application where the Series 8000 node must be located in a Zone 1 or Division 1 area—consult NovaTech for availability.

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Node Architecture

An 8000 Series node comprises single or redundant Ethernet Bus Inter-face Modules, up to 64 I/O modules, field terminals, and associated power supplies.

A schematic node architecture is shown below. Information from the I/O modules is transferred to and from the communication module (EBIM) via the Railbus. The Railbus is a fast, serial data bus with parallel module addressing and extends over the full length of the node. The parallel address architecture means that each I/O module position has a unique address which eliminates the need to 'train' modules during installation.

Power for the node is provided by integrated power supply modules; these convert the locally available power source into a regulated internal supply rail. This rail energizes the EBIM and all Railbus communication between the EBIM and I/O modules.

For some I/O module types—such as those with low-power and intrinsically safe field circuits—it also provides power for the field wiring. Where additional power is required for field devices (such as high current AC circuits), power can be provided by means of cabled connections from each module to external relays. This Busse Field Power facility reduces instal-

lation time by removing the need to make daisy chain wiring connections at the field terminals of each I/O module.

Node Operation

A typical request for data from the field might happen as follows:

The D/3® PAS requires the temperature from a particular thermocouple input at a particular node and transmits a signal on the I/O LAN. There are several Series 8000 nodes on the I/O LAN, but the EBIM at the chosen node recognizes its own node address, and acknowledges the request.

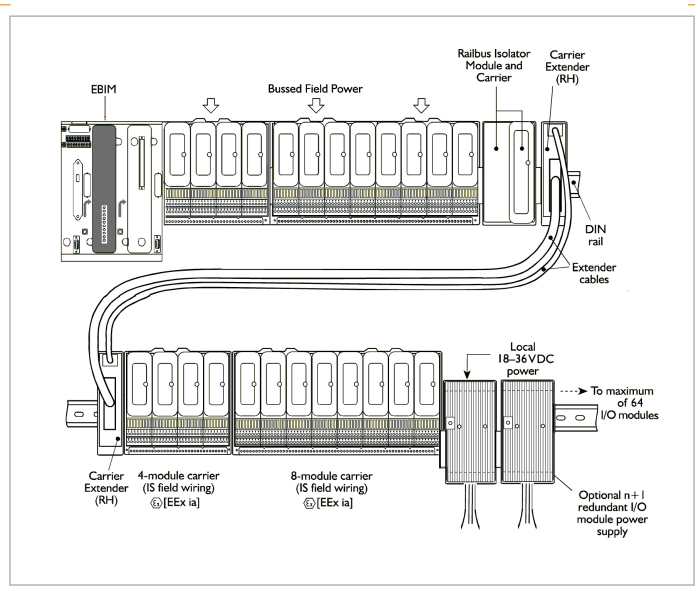
At each node, the input modules constantly monitor, linearize and digitize their respective field signals, and make them available to scanning on the node's internal bus (Railbus).

The EBIM continually scans the I/O modules via the Railbus, and builds up a map of the values of the input variables, ready for the PCM to read. These are converted into the LAN protocol and placed on the LAN by the EBIM, together with acknowledgement signals. The D/3 then interprets the signal and reconstructs the temperature reading.

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NovaTech 8000 Series I/O Components

Modules

I/O modules transfer signals to and from field instruments. Input modules receive signals from transmitters and sensors and convert them into a digital form for presentation to the EBIM. Output modules receive commands from the EBIM and transfer them to actuators. A wide range of modules is available, including types for low-level instrumentation, AC circuits, and intrinsically safe signals. I/O modules typically have 4, 8, or 16 field channels.

Carriers

Carriers allow the 8000 Series I/O to mount onto a flat panel or T- or G-section DIN rail. They support and interconnect the EBIM, power supplies, I/O modules and field terminals, and carry the address, data and power lines of the internal Railbus. They provide termination points for the LAN and field wiring cable screens and can also distribute bussed field power to the I/O modules. I/O module carriers support eight I/O modules.

Field Terminals

Field terminals provide the interface between the I/O modules and the field wiring. They include fusing and loop disconnect as options. A mechanical keying system prevents an I/O module from being connected to the wrong type of field terminal. Field terminals mount onto the module carrier, one to each I/O module. They are clamped firmly by the I/O module to form an electrical and mechanical assembly of high integrity. They may be replaced in service without removing carriers or disturbing the operation of other modules.

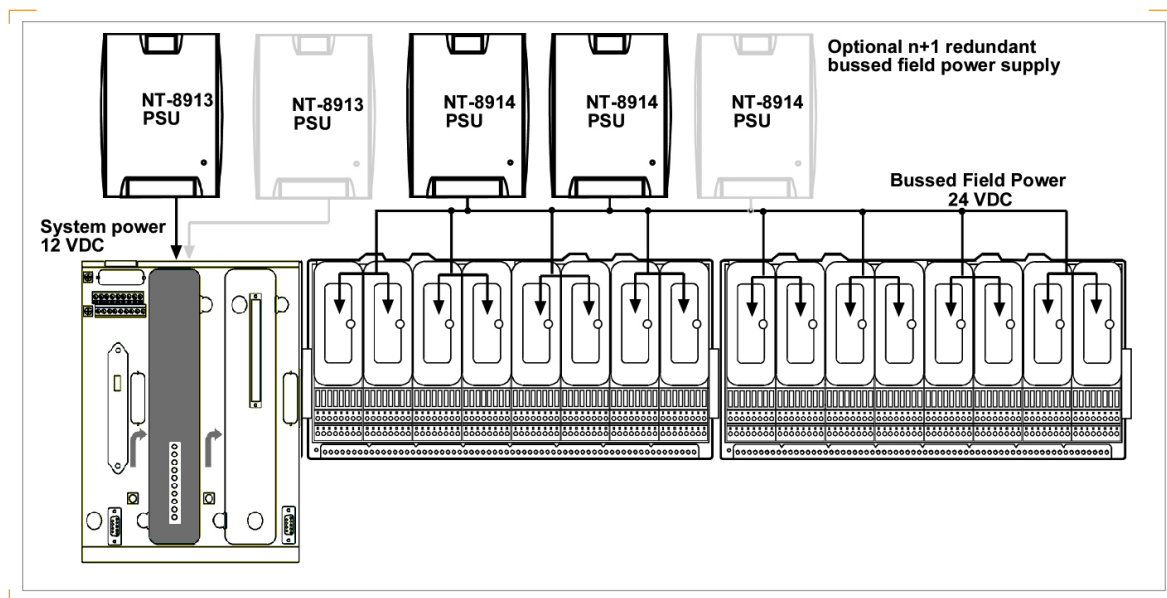
Power Supplies

8000 Series I/O power supplies accept locally available unregulated power and provide a regulated supply for the EBIM and I/O modules. Supply redundancy is supported. The system power supply at an 8000 Series node converts the local DC supply to power the node, and can also provide field power for I/O modules with low-level field circuits. Where heavy-current or AC mains circuits are handled by the I/O modules, the 8000 Series method for distributing field power avoids complex wiring at the field terminal and minimizes the backplane/carrier wiring.

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Ethernet Bus Interface Module (EBIM)

NovaTech 8000 Series I/O uses the Ethernet Bus Interface Module (EBIM) to provide a high speed Ethernet data connection to the D/3®. The EBIMs communicate using a proprietary protocol over Ethernet at speeds of 10/100MB to the D/3® PCMs.

NovaTech 8000 Series I/O Support

8000 Series I/O offers a variety of I/O boards and signal conditioning termination panels suitable for virtually every standard process panels suitable for virtually every standard process sensor and actuator. Details on signal conditioning termination panels, as well as their associated I/O function boards, can be obtained in individual specification sheets. The standard D/3® configuration supports such I/O signals as:

- Analog Inputs: 4-20 mA, 10-50 mA, 0-10V (programmable ranges of 0-50mV, 0-100mV, 0-1V and 0-10V), 100 ohm platinum RTDs, thermocouples
- Analog Outputs: 4-20 mA, 10-50 mA, 0-10V
- Digital and Pulse Inputs:
 - Contact Closures +5, +12, +24 and +10 to +32 VDC
 - Contact Closures 95 to 130 VAC
 - Pulse Train Inputs up to 100 KHz @ +5, +12, +24 VDC

- Pulse Train Inputs up to 50 Hz @ +10 to +32 VDC and 95 to 130 VAC
- Digital and Pulse Outputs:
 - DC Output +5, +12, +24, and +5 to +60 VDC
 - AC Output 12 to 140 VAC
 - Pulse Output 2 msec. to 3.3 sec. @ +5, +12, +24, and +5 to +60 VDC
 - Pulse Output 10 msec. to 11 min. @ +5, +12, +24, and +5 to +60 VDC
 - Pulse Output 2 msec. to 3.3 sec. @ 12 to 140 VAC
 - Pulse Output 10 msec. to 11 min. @ 12 to 140 VAC

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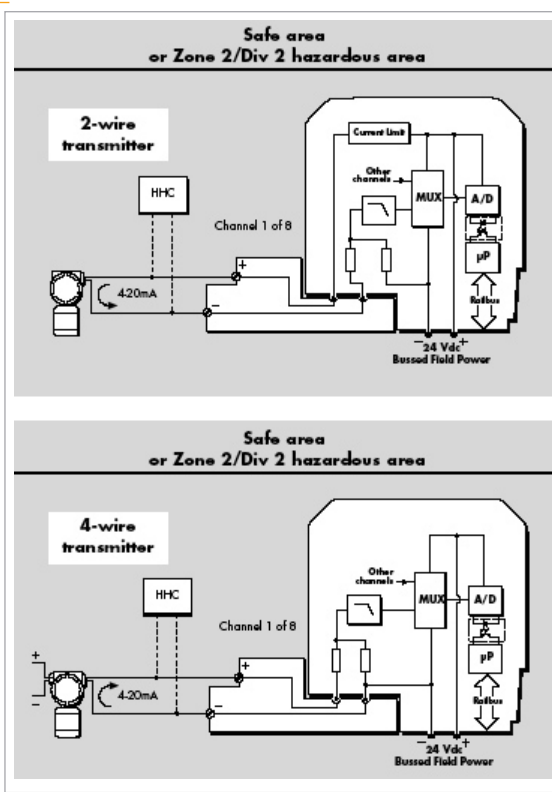
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- 8 single-ended 4-20 mA input channels
- Non-incendive field circuits
- HART pass-through
- HART variable and status reporting
- 2- or 4-wire transmitters
- open and short circuit detection
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of channels8, single-ended
 Nominal signal range (span)4 to 20 mA
 Full signal range.....1 to 23 mA
 Line fault detection
 Short circuit current> 23.5 mA
 Open circuit current< 0.5 mA
 Output voltage (@ 20mA).....13.5 V (min.)
 Output current32 mA (max.)
 Accuracy (over temp range)± 0.1% of span
 Resolution16 bits
 Repeatability0.05% of span
 Isolation
 (any channel to Railbus)100 V ac
 (between channels).....none



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8 Channel Analog Input 4-20 mA with HART®



NovaTech 8000 Series I/O Family

Configurable Parameters

Input filter time constantuser defined value
 Input dead zoneuser defined value
 Drive on failsafe..... disabled /upscale /downscale
 Channel status..... active /inactive
 HART variable and status reporting enable /disable

Response Time

Signal change to availability on Railbus
 4-20 mA mode27 ms (max.)
 HART mode.....0.75 s per channel

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{oc} = 28.7 \text{ V}$; $I_{sc} = 33 \text{ mA}$; $C_a = 0.17 \mu\text{F}$; $L_a = 11.0 \text{ mH}$

Power Supplies

Railbus (12V) current100 mA (typ.), 150 mA (max.)
 Bussed Field Power 2-wire Tx.....300 mA (max.)
 (@ 24 V dc ±10%) 4-wire Tx.....60 mA (max.)

Mechanical

Module Key CodeA1
 Module width42 mm
 Weight.....200 g

Field Terminals (2-WIRE TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazard-ous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive

Field Terminals (4-WIRE TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8615-FT-4W	-
Class 1, Div 2 or Zone 2 hazard-ous area	NT-8615-FT-4W	-

Contact:

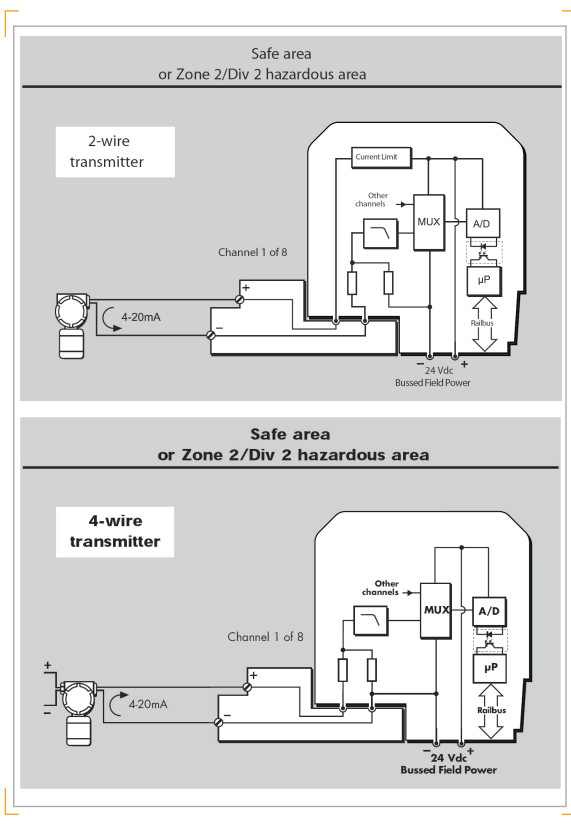
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- 8 single-ended 4-20mA input channels
- Non-incentive field circuits
- 4-20mA
- 2- or 4-wire transmitters
- Open and short circuit detection
- 24Vdc bussed field power required

Module Specifications

Inputs

Number of channels8, single-ended
 Nominal signal range (span)4 to 20 mA
 Full signal range.....1 to 23 mA
 Out of range alarm
 Lower threshold.....> 23.5 mA
 Upper threshold< 0.5 mA
 Output voltage (@ 20 mA).....13.5 V (min.)
 Output current32 mA (max.)
 Accuracy (over temp range)± 0.1% of span
 Resolution16 bits
 Repeatability0.05% of span
 Isolation
 (any channel to Railbus)100 V ac
 (between channels).....none



8-channel Analog Input 4-20 mA



NovaTech 8000 Series I/O Family

Configurable Parameters

Input filter time constantuser defined value
 Input dead zoneuser defined value
 Drive on failsafe..... disabled /upscale /downscale
 Channel status..... active /inactive

Response Time

Signal change to availability on Railbus27 ms (max.)

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{oc} = 28.7 \text{ V}$; $I_{sc} = 33 \text{ mA}$; $C_a = 0.17 \mu\text{F}$; $L_a = 11.0 \text{ mH}$

Power Supplies

Railbus (12V) current100 mA (typ.)/150 mA (max.)
 Bussed Field Power2-wire Tx 300 mA (max.)
 (@ 24 Vdc ± 10%) 4-wire Tx 60 mA (max.)

Mechanical

Module Key CodeA1
 Module width42 mm
 Weight.....200 g

Field Terminals (2-wire TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazard-ous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive Fused

Field Terminals (4-wire TX)

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8615-FT-4W	-
Class 1, Div 2 or Zone 2 hazard-ous area	NT-8615-FT-4W	-

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- 8 single-ended input channels
- Non-incendive field circuits
- 1–5 V inputs open circuit and short circuit detection
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of channels8, single-ended
 Nominal signal range (span)1 to 5 V
 Full signal range0.19 to 5.64 V
 Input impedance.....2 M Ω
 Out of range alarm
 Lower threshold< 0.19 V
 Upper threshold> 5.64 V
 Accuracy (over temp range) \pm 0.1% of span
 Resolution16 bits
 Repeatability0.05% of span
 Isolation (any channel to Railbus)100 V ac
 (between channels).....none

Configurable Parameters

Input filter time constantuser defined value
 Input dead zoneuser defined value
 Drive on failsafe..... disabled /upscale /downscale
 Channel status..... active /inactive

Response Time

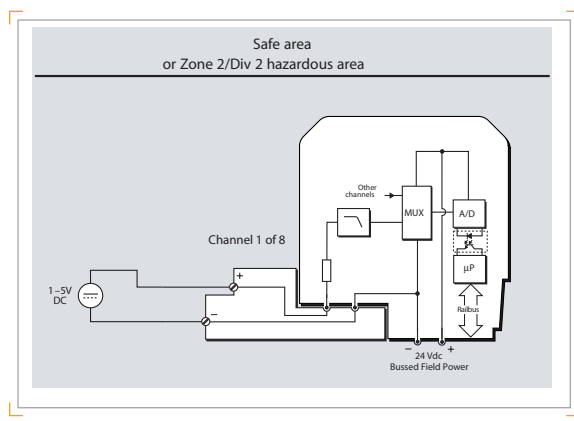
Signal change to availability on Railbus27 ms (max.)

Safety

FM non-incendive field wiring parameters (each channel)
 V_{oc} = 28.7 V; I_{sc} = 33 mA; C_a = 0.17 μ F; L_a = 11.0 mH

Power Supplies

Railbus (12V) current100 mA (typ.)/150 mA (max.)
 Bussed Field Power 60 mA (max.) at 24 Vdc \pm 10%



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8-channel Analog Input 1–5 V



NovaTech 8000 Series I/O Family

Mechanical

Module Key CodeA1
 Module width42 mm
 Weight.....200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8615-FT-4W 4-wire transmitter	-
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8615-FT-4W 4-wire transmitter	-

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- 8 isolated, universal, input channels
- Configurable on a channel by channel basis:
4-20mA, THC, RTD, resistance & voltage
- 250V ac rms channel to channel isolation
- Thermocouple types B, E, J, K, N, R, S, T, W3, W5, Russian K, Russian L
- RTD types Pt100, jPt100, Pt200, Pt500, Ni120, Cu10
- Volt input types $\pm 120\text{mV}$, 0-1V, 0-5V, 1-5V, 0-10V, $\pm 10\text{V}$
- 2 or 3-wire RTDs
- 2 or 4-wire transmitters
- Non-incendive field circuits
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of configurable channels8 isolated

4-20mA Inputs

Nominal signal range (span)4 to 20mA
 Full signal range (FSR).....0 to 25mA
 Output voltage (@ 20mA)13.5 V (min.)
 Output current (linear operation)25 mA (max.)
 Short circuit current (max.)75 mA for 100ms
 (Output turns off after ~100ms at more than 25mA)
 Calibration accuracy
 10°C to 40°C $\pm 0.1\%$ of FSR
 -40°C to 70°C $\pm 0.3\%$ of FSR
 Resolution15 bits (typ.)
 Repeatability0.05% of span

Thermocouple Inputs

THC TypesB, E, J, K, N, R, S, T, W3, W5, Russian K, Russian L
 Calibration Accuracy
 10°C to 40°C..... $\pm 0.1\%$ of span (typ.)
 -40°C to 70°C $\pm 0.2\%$ of span (typ.)
 Cold junction compensation error $\dagger < \pm 1^\circ\text{C}$ (-40°C to + 70°C)



8-channel Isolated Universal Analog Input

4-20mA with Thermocouple, RTD, Voltage



NovaTech 8000 Series I/O Family

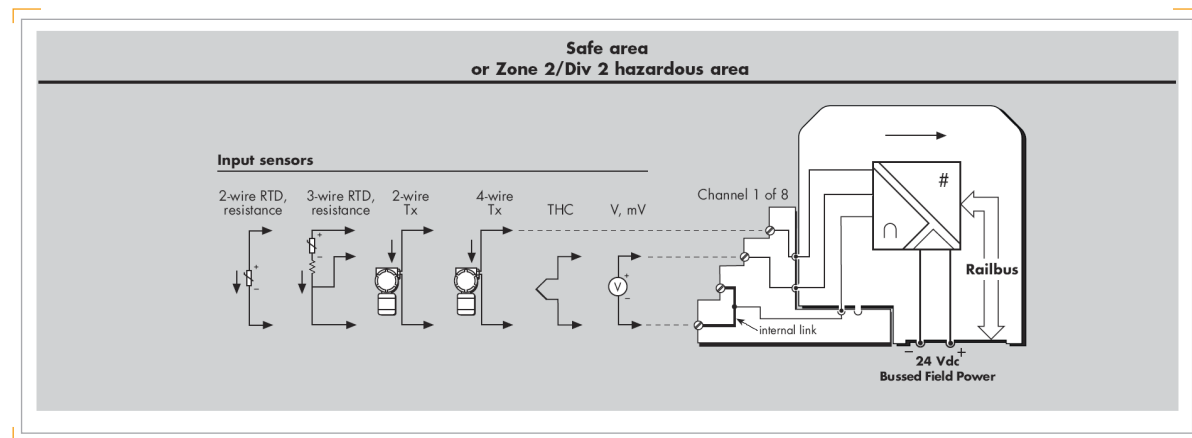
Resolution14 bits (typ.)
 Optional open circuit bleed current $\pm 1.2\mu\text{A}$ (nom.)
 Open circuit detection time1 sec
(with $< 0.5 \mu\text{F}$ cable capacitance)

RTD Input (2 or 3 Wire)

RTD typesPt100, Pt200, Pt500, Cu10, Ni120; jPt100
 Maximum wire resistance40 ohms
 Calibration accuracy 3-wire
 10°C to 40°C $\pm 0.1\%$ of span
 -40°C to 70°C $\pm 0.2\%$ of span
 RTD excitation currentselected for ~0.2 mW at 0°C
 Resolution14 bits (typ.)
 Open circuit detection time1 sec
(with $< 0.5 \mu\text{F}$ cable capacitance)

Resistance Input (2 or 3 Wire)

Input resistance range (span)0 to 110, 280,
470 and 1000 ohms
 Calibration accuracy 3-wire
 10°C to 40°C $\pm 0.2\%$ of span
 -40°C to 70°C $\pm 0.4\%$ of span
 Maximum wire resistance40 ohms
 Resistance excitation current ..selected for ~1.0 mW at max R
 Resolution14 bits (typ.)



\dagger C J compensation located in recommended field terminal

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8-channel Isolated Universal Analog Input

4-20mA with Thermocouple, RTD, Voltage

Voltage Input

Nominal signal range 1 (span) ± 120 mV, 0-1 V,
.....0-5V, 1-5V, 0-10V, ± 10 V
Resolution14 bits (typ.)

Configurable Parameters

Sensor typeuser selectable
Input dead zoneuser defined value
Channel statusactive/inactive
Filter/sample ratesuser selectable

General Specifications

Common mode rejection (using 50/60Hz filter)
.....> 120 dB @ 50/60 Hz
Series mode rejection (using 50/60Hz filter)
.....> 65 dB @ 50/60 Hz
Maximum input voltage (except current I/P) ± 25 V
Common mode voltage between channels250 V ac rms
Isolation
(channel to channel)250 V ac rms
(any channel to Railbus)250 V ac rms
(any channel to Bussed Field Power)250 V ac rms
(Railbus to Bussed Field Power)150 V ac rms
Input filter frequency responsetime constant 4 ms
Input impedance> 1 M ohm
Data Format0 to 66535 corresponds to selected span
Open circuit detection< 1 sec
.....(with < 0.5 μ F cable capacitance)

Safety

FM non-incendive field wiring parameters (each channel)
.....Voc=20 V; Isc = 75mA; Ca= 0.61 μ F; La= 11.3mH

Power Supplies

Railbus (12V) current60 mA (typ.)
.....125 mA (max.)
Bussed Field Power @ 24 V dc $\pm 10\%$
All configurations - except 4/20mA with excitation ..125 mA
(max.)
4/20mA with excitation300 mA (max.)

Mechanical

Module Key CodeA1*
Module width42mm
Weight185g

* WARNING If this module is being used in an application that requires 250V ac rms channel-to-channel isolation, it must be replaced only with an A1 key code module that has equivalent, or better, channel-to-channel isolation rating.

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
All Purpose	NT-8608-FT-RT (no internal CJ)	8607-FT-TC (see note) (internal CJ)
THC	NT-8606-FT-TC (internal CJ)	8608-FT-RT (see note) (no internal CJ)

NOTE: For further advice on field terminals for this module and for operations with more than one type of sensor, see NovaTech 8000 I/O Hardware User's Guide

NovaTech®

NT-8132-AI-UN

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- 4 thermocouple or mV* input channels
- Cold junction compensation

Module Specifications

Inputs

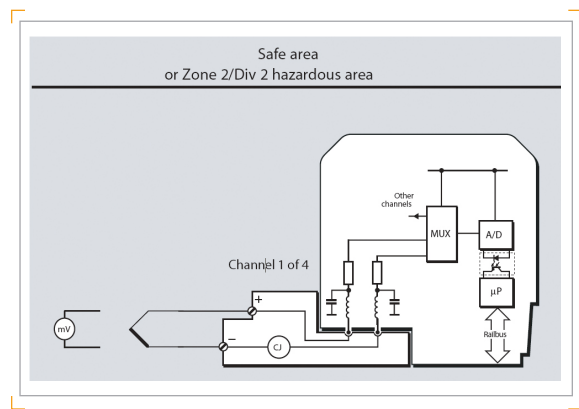
Number of channels4
 THCs types
B,E,J,K,N,R,S, or T to EN 60584-2, IEC584-2, BS4937;
W3 and W5

Input Ranges

Input Type	Range
mV	0 to 120 mV
Thermocouples: B	0 to 1820 °C
E	- 270 to + 1000 °C
J	- 210 to + 1200 °C
K & N	- 270 to + 1372 °C
R & S	- 50 to + 1768 °C
T	- 270 to + 400 °C
W3 & W5	0 to + 2315 °C

Calibration Accuracy

mV input.....± 0.2% of span (- 40 to + 70 °C)
± 0.1% of span(+10 to + 40 °C)
 THC inputdependent on thermocouple type-
 Cold junction compensation error.....<± 1°C (-40 to + 70 °C)
 Resolution15 bits plus sign bit
 Common mode rejection.....> 80 dB @ 50/60 Hz
 Series mode rejection.....> 40 dB @ 50/60 Hz
 Maximum input voltage± 4.0 V
 Common mode voltage between channels.....± 4.5 V (max.)
 Isolation (any channel to Railbus)250 V ac rms
 Open circuit bleed current.....± 0.5 µA (nom.)



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4-channel Analog Input Thermocouple and mV



NovaTech 8000 Series I/O Family

Configurable Parameters

Sensor typeuser selectable
 Input dead zone (hysteresis).....user defined value
 Selectable input filteringoff /2 reading avge./running avge.
 Drive on open circuit fault..... disabled /upscale /downscale
 Channel status.....active/ inactive

Response Times

Signal change to availability on Railbus
120 ms (min.)
420 ms (max.)
 O/C sensor detection.....≤ 10 s

Safety

FM non-incendive field wiring parameters (each channel)
Voc = 10.5 V; Isc = 3.6 mA; Ca = 14.9 µF; La = 1000 mH

Power Supplies

Railbus (12V) current.....150 mA (typ.)
200 mA (max.)
 Bussed Field Powernot required

Mechanical

Module Key CodeC1
 Module width42 mm
 Weight.....200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8605-FT-TC THC	-
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8605-FT-TC THC	-

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- 4 RTD or resistance* source inputs
- Function defined by configuration
- 2-, 3- or 4-wire RTD types accommodated

Module Specifications

Inputs

Number of channels4
 RTD input (2,3, or 4 wire)
Pt100 to BS1904/DIN43760/IEC 75
Ni120; jPt100 to JIS C1604: 1989

Input Ranges

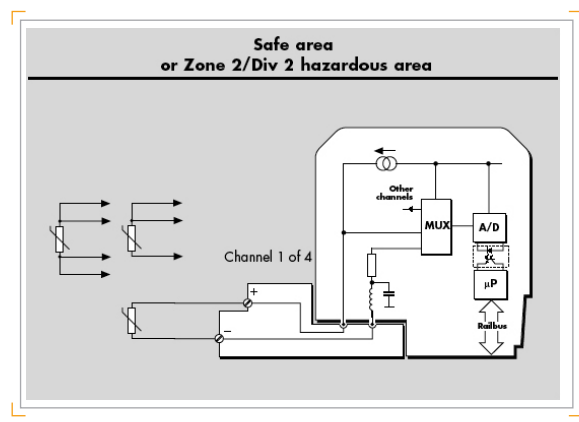
Input Type	Range
Resistance	Consult NovaTech for availability
RTDs: Pt100	- 200 to + 850 °C
jPt100	- 200 to + 510 °C
Ni120	- 60 to + 320 °C

Input resistance range (span).....0 to 500 Ω

Accuracy (% of span)

Tamb	(RTD & Ω inputs)
25°C	± 0.05%
+10 to + 40°C	± 0.1%
- 40 to + 70°C	± 0.2%

RTD excitation current200 µA (nom.)
 Resolution15 bits plus sign bit
 Common mode rejection.....> 80 dB @ 50/60 Hz
 Series mode rejection.....> 40 dB @ 50/60 Hz
 Isolation (any channel to Railbus)250 V ac rms
 Open circuit bleed current.....0.5 µA (nom.)



4-channel Analog Input RTD and Ω



NovaTech 8000 Series I/O Family

Configurable Parameters

Sensor type.....user selection
 Input deadzoneuser defined value
 Selectable input filtering....off /2-reading avg./running avg.
 Drive on open circuit fault..... disabled /upscale
 Channel status.....active/ inactive
 Offset (2-wire RTD mode).....user defined value

Response Times

Signal change to availability on Railbus
180 ms (min.)
840 ms (max.)
 O/C sensor detection.....≤ 10 s

Safety

FM non-incendive field wiring parameters (each channel)
V_{oc} = 10.5 V; I_{sc} = 3.6 mA; C_a = 14.9 µF; L_a = 1000 mH

Power Supplies

Railbus (12V) current.....150 mA (typ.)
200 mA (max.)
 Bussed Field Powernot required

Mechanical

Module Key CodeC1
 Module width42 mm
 Weight.....200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8606-FT-RT RTD	-
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8606-FT-RT RTD	-

*Consult NovaTech for availability.

Contact:

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T: 410.753.8300
 Toll Free: 800.253.3842
www.novatechweb.com

- 8 single-ended 4-20 mA output channels
- Non-incendive field circuits
- HART pass-through
- HART variable and status reporting
- Valve positioners and remote indicators, etc.
- Open circuit detection on each channel
- 24 V dc bussed field power required

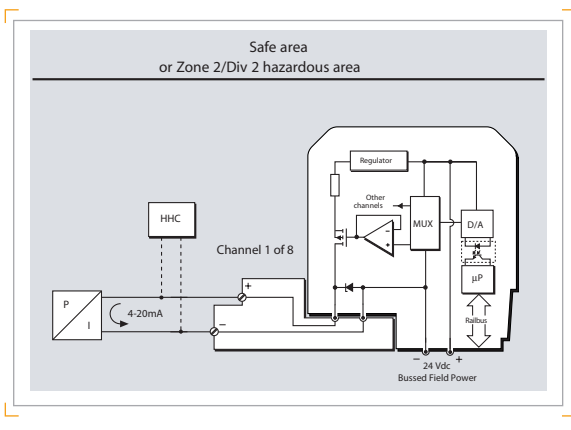
Module Specifications

Inputs

Number of channels8, single-ended
 Nominal signal range (span)4 to 20 mA
 Full signal range.....1 to 23 mA
 Open loop detection threshold 0.7 ± 0.25 mA
 Output compliance20 mA at 21.6 V dc supply
(into 700 Ω load)
 Accuracy (over temp range) $\pm 0.25\%$ of span
 Resolution12 bits
 Isolation
 (any channel to Railbus)100 V ac
 (between channels).....none

Configurable Parameters

Initialization state.....predefined value
 Drive on fail-safepredefined value/last value
 Channel status..... active /inactive
 HART variable and status reporting.....enable /disable



8 Channel Analog Output 4-20 mA with HART®



NovaTech 8000 Series I/O Family

Response Time

Signal change to availability on Railbus
 4-20 mA mode25 ms (max.)
 HART mode.....0.75 s per channel

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{oc} = 28.7$ V; $I_{sc} = 33$ mA; $C_a = 0.17$ μ F; $L_a = 11.0$ mH

Power Supplies

Railbus (12V) current100 mA (typ.)
150 mA (max.)
 Bussed Field Power 300 mA (max.) at 24 Vdc $\pm 10\%$

Mechanical

Module Key CodeA4
 Module width42 mm
 Weight.....200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazardous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive

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- 8 single-ended outputs
- 4–20 mA
- For I/P converters and remote indicators, etc
- Open circuit detection is provided on each channel
- 24 V dc bussed field power required

Module Specifications

Outputs

Number of channels8, single-ended
 Nominal signal range (span)4 to 20 mA
 Full signal output range1 to 23 mA
 Open loop detection threshold0.7 ± 0.25 mA
 Output compliance
20 mA at 21.6 V dc supply (into 700 Ω load)
 Accuracy (over temp range)± 0.25% of span
 Output ripple.....< 0.02% of span
 Resolution12 bits
 Isolation
 any channel to Railbus100 V ac

Configurable Parameters

Initialization state.....predefined value
 Drive on fail-safepredefined value / last value
 Channel status.....active / inactive

Response time

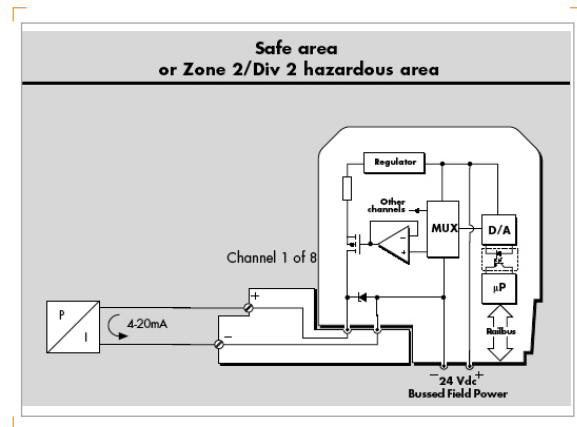
From Railbus command to output change25 ms (max.)

Safety

FM non-incendive field wiring parameters (each channel)
V_{oc} = 28.7 V; I_{sc} = 33 mA; C_a = 0.17 µF; L_a = 11.0 mH

Power Supplies

Railbus (12V) current100 mA (typ.)
150 mA (max.)
 Bussed Field Power.....300 mA (max.) @ 24 V dc ±10%
 Quiescent current60 mA



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8-channel Analog Output 4-20 mA



NovaTech 8000 Series I/O Family

Mechanical

Module Key CodeA4
 Module width42 mm
 Weight.....200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazardous area	NT-8601-FT-NI Non-incendive	NT-8603-FT-FU Non-incendive Fused

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- 8 discrete isolated inputs
- 24 V dc field voltage sources
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs

Number of channels8
 OFF voltage.....< 3.2 V dc
 ON voltage> 11 V dc
 Wetting current6.3 mA (nom.) @ 24 V dc
 Minimum pulse width detected3 ms
 Maximum switching frequency (no-filtering).....200 Hz
 Maximum voltage
 Input30 V dc
 Reverse input.....– 25 V dc

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable /disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable /disable

Response Time

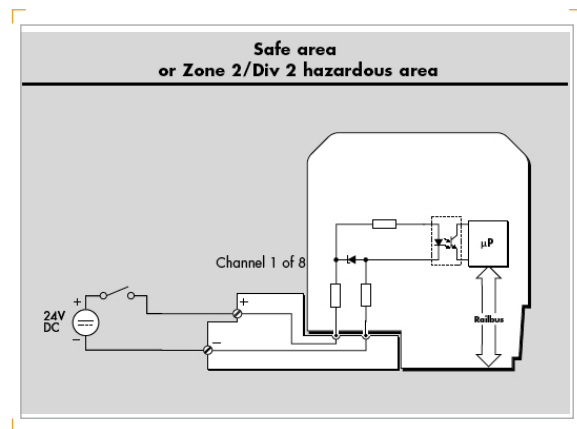
I/O response time
 Field event to new data available on Railbus.....3 ms (max.)

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{max} = 30 \text{ V}$; $I_{max} = 100 \text{ mA}$; $C_i = 0 \mu\text{F}$; $L_i = 0 \text{ mH}$

Power Supplies

Railbus (12V) current.....35 mA (typ.)
55 mA (max.)
 Bussed Field Powernot required



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8-channel Discrete Input

24 V dc, isolated, sinking



NovaTech 8000 Series I/O Family

Mechanical

Module Key Code.....B2
 Module width42 mm
 Weight.....170 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard †	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazardous area	NT-8601-FT-NA Non-arcing †	NT-8611-FT-FU Non-arcing, Fused

† External fusing of the Field Power supply is recommended in order to protect the field wiring.

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- 8 discrete inputs for dry contact switches
- 24 V dc provided on input high side
- Returns commoned internally
- Pulse counting option
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of channels8
 OFF current< 0.69 mA
 ON current.....> 2.24 mA
 Wetting current5 mA (typ.)
 Minimum pulse width detected3 ms
 Maximum switching frequency (no-filtering).....200 Hz
 Isolation (any channel to Railbus)250 V ac

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable /disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable /disable

Response Time

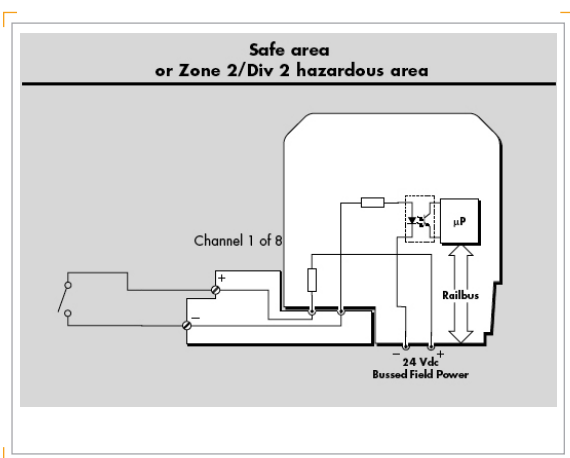
I/O response time
 Field event to new data available on Railbus.....3 ms (max.)

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{oc} = 30 \text{ V}$; $I_{sc} = 15.2 \text{ mA}$; $C_a = 0.12 \mu\text{F}$; $L_a = 151 \text{ mH}$

Power Supplies

Railbus (12V) current.....35 mA (typ.)
55 mA (max.)
 Bussed Field Power40 mA, @ 18—36 V dc



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8-channel Discrete Input

24 V dc, non-isolated, module powered



NovaTech 8000 Series I/O Family

Mechanical

Module Key Code.....B1
 Module width42 mm
 Weight.....170 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard †	NT-8604-FT-FU
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8601-FT-NI Non-incendive †	NT-8603-FT-FU Non-incendive, fused

† External fusing of the field power supply is recommended in order to protect the field wiring.

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- 16 input channels for dry contact switches
- 24 V dc provided on input high side
- Returns commoned internally
- Pulse counting option
- 24 V dc bussed field power required

Module Specifications

Inputs

Number of channels16
 OFF current< 0.3 mA
 ON current.....> 1.2 mA
 Wetting current2.8 mA (typ.)
 Minimum pulse width detected5 ms
 Max input freq in pulse counting mode (no-debounce)100 Hz
 Isolation (any channel to Railbus)250 V ac

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable /disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable /disable

Response Time

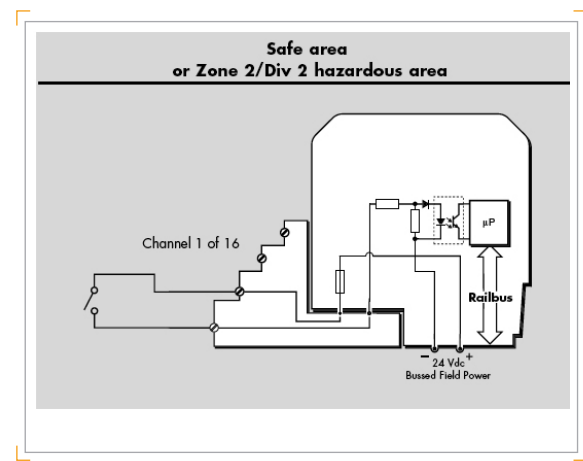
I/O response time
 Field event to new data available on Railbus.....5 ms (max.)

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{oc} = 30 \text{ V}$; $I_{sc} = 3.5 \text{ mA}$; $C_a = 0.12 \mu\text{F}$; $L_a = 1000 \text{ mH}$

Power Supplies

Railbus (12V) current.....90 mA (typ.)
135 mA (max.)
 Bussed Field Power.....60 mA, @ 18–30 V dc



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16-channel Discrete Input

24 V dc, non-isolated, module-powered



NovaTech 8000 Series I/O Family

Mechanical

Module Key Code.....E1
 Module width42 mm
 Weight.....210 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8617-FT-NI 16 channel DI	-
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8617-FT-NI 16 channel DI	-

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- 16 input channels
- 24 V dc field voltage sources
- Individually isolated channels
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs

Number of channels16
 OFF voltage.....< 3.4 V dc
 ON voltage> 11 V dc
 Wetting current2.8 mA (nom.) @ 24 V dc
 Minimum pulse width detected5 ms
 Max input freq in pulse counting mode (no-debounce)100 Hz
 Maximum voltage
 Input30 V dc
 Reverse input - 25 V dc
 Isolation (Any Channel to railbus)250 V ac
 Isolation (channel to channel)150 V peak

Configurable Parameters

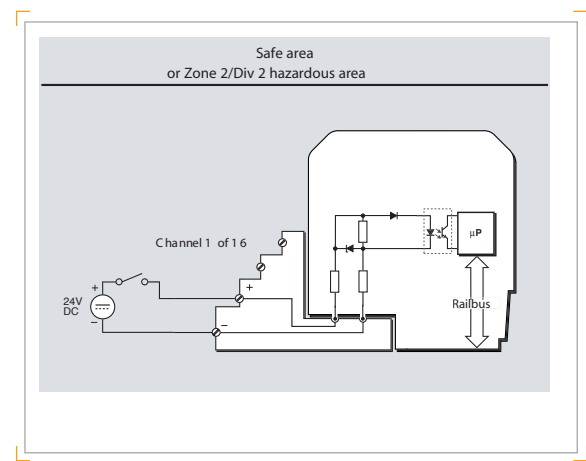
Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Pulse countingenable /disable

Response Time

I/O response time5 ms (max.)
 (Field event to new data available on Railbus)

Safety

FM non-incendive field wiring parameters (each channel)
 $V_{max} = 30 \text{ V}$; $I_{max} = 100 \text{ mA}$; $C_i = 0 \text{ } \mu\text{F}$; $L_i = 0 \text{ mH}$



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16-channel Discrete Input

24 V dc, isolated, sinking



NovaTech 8000 Series I/O Family

Power Supplies

Railbus (12V) current.....90 mA (typ.)
135 mA (max.)
 Bussed Field Powernot required

Mechanical

Module Key CodeE2
 Module width42 mm
 Weight.....210 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8617-FT-NI † 16 channel DI	-
Class 1, Div 2 or Zone 2 hazardous area	NT-8617-FT-NI † 16 channel DI	-

† External fusing of the Field Power supply is recommended in order to protect the field wiring.

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- 8 discrete inputs
- 115 V ac field voltage sources
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs

Number of channels8
 OFF voltage.....< 34 V ac
 ON voltage> 84 V ac
 Wetting current2 mA (nom.) @ 115 V ac
 Max. input voltage130 V ac
 Frequency50 / 60 Hz

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable / disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable / disable

Response Time

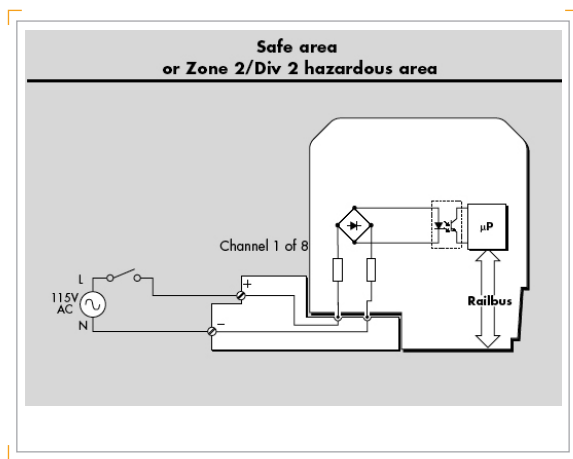
I/O response time
 Field event to new data available on Railbus....33 ms (max.)

Power Supplies

Railbus (12V) current.....40 mA (typ.)
60 mA (max.)
 Bussed Field Powernot required

Mechanical

Module Key Code.....E4
 Module width42 mm
 Weight.....170 g



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8-channel Discrete Input

115 V ac, isolated, sinking



NovaTech 8000 Series I/O Family

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard †	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazardous area	NT-8610-FT-NA Non-arching †	NT-8611-FT-FU Non-arching, fused

† External fusing of the Field Power supply is recommended in order to protect the field wiring.

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- 8 discrete inputs for dry contact switches
- 115 V ac provided on input high side
- Returns commoned internally
- Pulse counting option
- 115 V ac Bussed Field Power required

Module Specifications

Inputs

Number of channels8
 OFF current< 0.56 mA
 ON current.....> 1.4 mA
 Wetting current2 mA (nom.) @ 115 V ac

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable /disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable /disable

Response Time

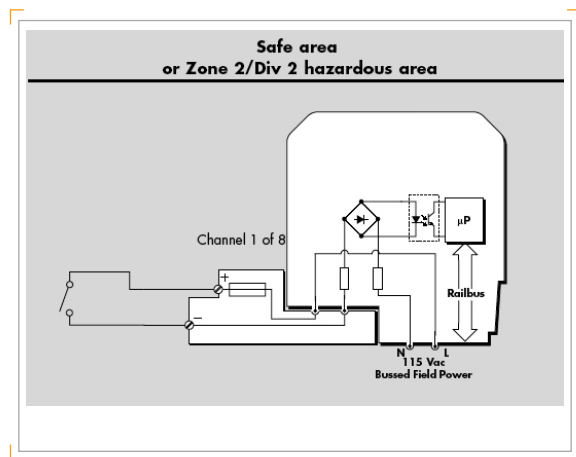
I/O response time
 Field event to new data available on Railbus....33 ms (max.)

Power Supplies

Railbus (12V) current.....40 mA (typ.)
60 mA (max.)
 Bussed Field Power115 V ac \pm 10%
 Frequency50 / 60 Hz

Mechanical

Module Key Code.....E1
 Module width42 mm
 Weight.....170 g



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8-channel Discrete Input

115 V ac, non-isolated, module powered



NovaTech 8000 Series I/O Family

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard †
Class 1, Div 2 or Zone 2 hazardous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing †

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.

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- 8 discrete isolated inputs
- 230 V ac field voltage sources
- User definable input threshold
- Pulse counting option

Module Specifications

Inputs

Number of channels8
 OFF voltage.....< 68 V ac
 ON voltage> 168 V ac
 Wetting current1 mA (nom.) @ 230 V ac
 Max. input voltage265 V ac
 Frequency50 / 60 Hz

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable /disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable /disable

Response Time

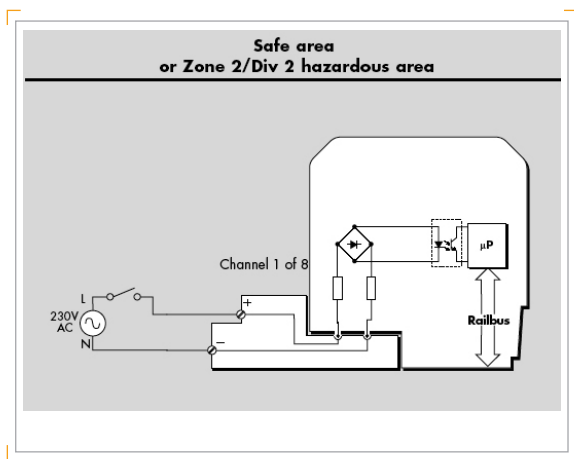
I/O response time
 Field event to new data available on Railbus.....33 ms (max.)

Power Supplies

Railbus (12V) current.....40 mA (typ.)
60 mA (max.)
 Bussed Field Powernot required

Mechanical

Module Key Code.....E5
 Module width42 mm
 Weight.....170 g



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8-channel Discrete Input

230 V ac, isolated, sinking



NovaTech 8000 Series I/O Family

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8602-FT-ST Standard †	NT-8604-FT-FU Fused
Class 1, Div 2 or Zone 2 hazardous area	NT-8610-FT-NI Non-arcing †	NT-8611-FT-FU Non-arcing, fused

† External fusing of the Field Power supply is recommended in order to protect the field wiring.

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- 8 discrete inputs for dry contact switches
- 230 V ac provided on input high side
- Returns commoned internally
- Pulse counting option
- 230 V ac Bussed Field Power required

Module Specifications (See also System Specification)

Inputs

Number of channels8
 OFF current< 0.28 mA
 ON current.....> 0.71 mA
 Wetting current1 mA (nom.) @ 230 V ac

Configurable Parameters

Selectable input filterfast, slow or user defined
 (User defined permits 0 to 512 ms values in 2ms steps)
 Latch inputs.....enable /disable
 Latch polarity.....latch on high / latch on low
 Pulse countingenable /disable

Response Time

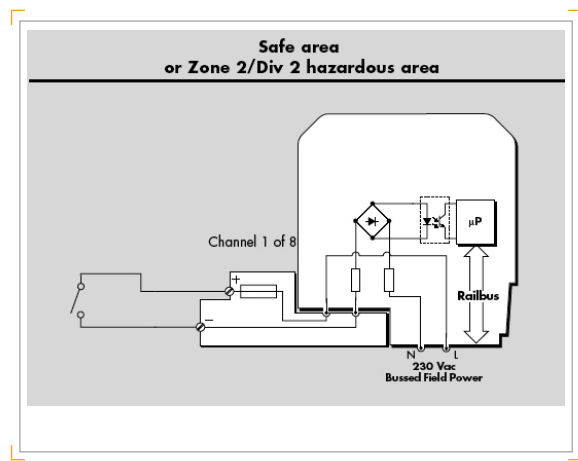
I/O response time
 Field event to new data available on Railbus....33 ms (max.)

Power Supplies

Railbus (12V) current.....40 mA (typ.)
60 mA (max.)
 Bussed Field Power207 to 265 V ac
 Frequency50 / 60 Hz

Mechanical

Module Key Code.....E2
 Module width42 mm
 Weight.....170 g



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8-channel Discrete Input

230 V ac, non-isolated, module powered



NovaTech 8000 Series I/O Family

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard †
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing †

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.

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- 8 powered outputs
- Controls solenoids and relays
- Common load supply of up to 60 V dc
- Discrete or pulsed outputs
- 1A per channel switched current
- 2–60 V dc bussed field power required

Module Specifications

Outputs

Number of channels	8
Output voltage range.....	2–60 V dc
ON voltage drop.....	0.25 V (max.)
OFF leakage current	1.0 mA (max.)
Switched current per channel ††	
Continuous *.....	1 A
For < 100 ms.....	4 A
For < 20 ms.....	6 A

Configurable Parameters

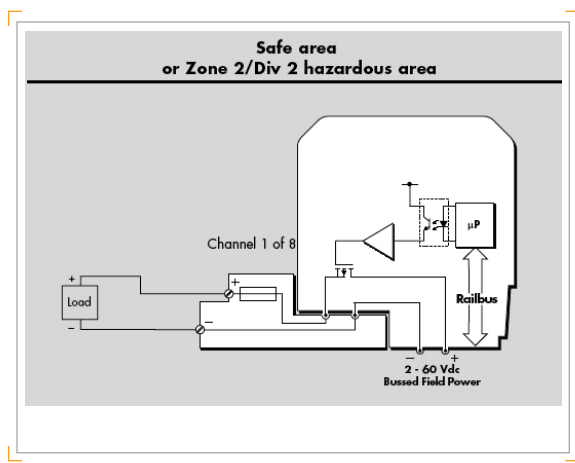
Output initialization state.....	predefined value
Fail-safe.....	predefined value/last value
Output	discrete, momentary or continuous pulse‡
Pulse width.....	2 ms to 130 s

Response Time

Response time	
From Railbus command to output change	1 ms (max.)

Power Supplies

Railbus (12V) current.....	45 mA (typ.)
.....	70 mA (max.)
Bussed Field Power	2 to 60 V dc



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8-channel Discrete Output

2–60 V dc, non-isolated, module powered



NovaTech 8000 Series I/O Family

Mechanical

Module Key Code.....	B6
Module width	42 mm
Weight.....	200 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard †
Class 1, Div 2 or Zone 2 hazardous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing †

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.

†† The total instantaneous switched current should not exceed the following:

10 A for < 100 ms

18 A for < 20 ms

*Limited to 6 A per module

‡Consult NovaTech for availability

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www.novatechweb.com

- 8 fully isolated semiconductor switched outputs
- Controls solenoids and relays
- For load supplies of up to 60 V dc
- Discrete or pulsed outputs
- 1A per channel switched

Module Specifications

Outputs

Number of channels	8
Output voltage range.....	2–60 V dc
ON voltage drop.....	0.25 V (max.)
OFF leakage current	1.0 mA (max.)
Switched current per channel	
Continuous.....	1 A
For < 100ms	4 A
For < 20ms	6 A

Configurable Parameters

Output initialization state.....	predefined value
Fail-safe.....	predefined value/last value
Output	discrete, momentary or continuous pulse†
Pulse width.....	2 ms to 130 s

Response Time

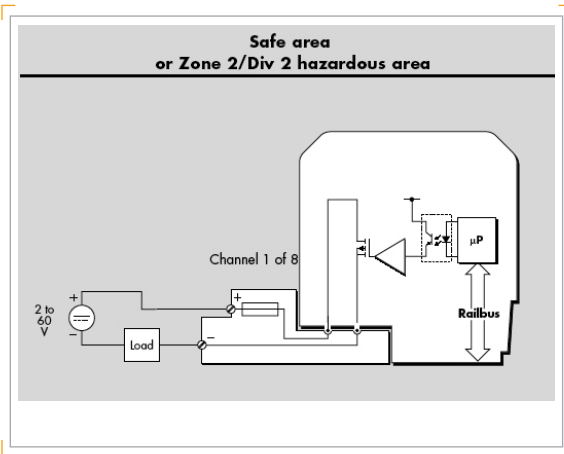
Response time	
From Railbus command to output change	3 ms (max.)

Power Supplies

Railbus (12V) current.....	45 mA (typ.)
.....	70 mA (max.)
Bussed Field Power	not required

Mechanical

Module Key Code.....	B5
Module width	42 mm
Weight.....	200 g



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8-channel Discrete Output

2–60 V dc, isolated, unpowered



NovaTech 8000 Series I/O Family

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard
Class 1, Div 2 or Zone 2 hazardous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing

Note: External fusing to protect field wiring is recommended.

†Consult NovaTech for availability.

Contact:

NovaTech Process Solutions, LLC
11500 Cronridge Dr., Suite 110
Owings Mills, MD 21117

T: 410.753.8300
Toll Free: 800.253.3842
www.novatechweb.com

- 8 powered outputs
- Controls solenoids and relays
- Common load supply of up to 265 V ac
- Discrete or pulsed outputs
- 1A per channel maximum
- 20–265 V ac bussed field power required

Module Specifications

Outputs

Number of channels	8
Output voltage range.....	20–265 V ac
Frequency	50 / 60 Hz
ON voltage drop.....	< 1.2 V
OFF leakage current	< 4mA
Switched current per channel ††	
Continuous.....	1 A*
For < 100 ms.....	5 A
For < 20 ms.....	20 A
Minimum load current, per channel	
@ 115 V ac.....	11 mA
@ 230 V ac.....	5 mA

Configurable Parameters

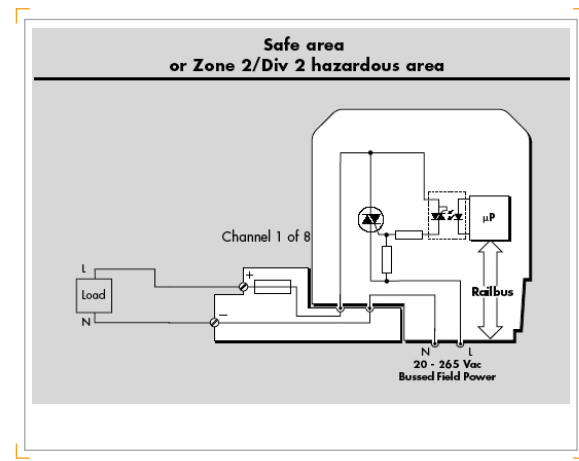
Output initialization state.....	predefined value
Fail-safe.....	predefined value/last value
Output	discrete, momentary or continuous pulse†
Pulse width.....	2 ms to 130 s

Response Time

Response time (max.) ..2 ms + 1/2 cycle of mains frequency
(From Railbus command to output change)

Power Supplies

Railbus (12V) current.....	75 mA (typ.)
.....	125mA (max.)
Bussed Field Power (voltage).....	20 to 265 V ac



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8-channel Discrete Output

20-265 V ac, non-isolated, module powered



NovaTech 8000 Series I/O Family

Mechanical

Module Key Code	F1
Module width	42 mm
Weight.....	220 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard †
Class 1, Div 2 or Zone 2 hazardous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing †

† Alternative fusing in the field wiring is recommended if it is not provided in the field terminal.

†† Stated figures are for operation with unfused field terminal. When operating with 2 A fused field terminal part no. NT-8604-FT-FU, maximum switched current is 5 A inrush for <10 ms pulse width at 0.1% duty cycle and <108 operations

*Limited to 3 A per module.

‡Consult NovaTech for availability

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- 8 fully isolated semiconductor switched outputs
- Controls solenoids and relays
- For load supplies of up to 250 V ac
- Discrete or pulsed outputs
- 1A per channel switched

Module Specifications

Outputs

Number of channels	8
Output voltage range.....	20–265 V ac
Frequency	50 / 60 Hz
ON voltage drop.....	< 1.2 V
OFF leakage current	< 4 mA
Switched current per channel †	
Continuous.....	1 A*
For < 100ms	5 A
For < 20ms	20 A
Minimum load current, per channel	
@ 115 V ac.....	11 mA
@ 230 V ac.....	5 mA

Configurable Parameters

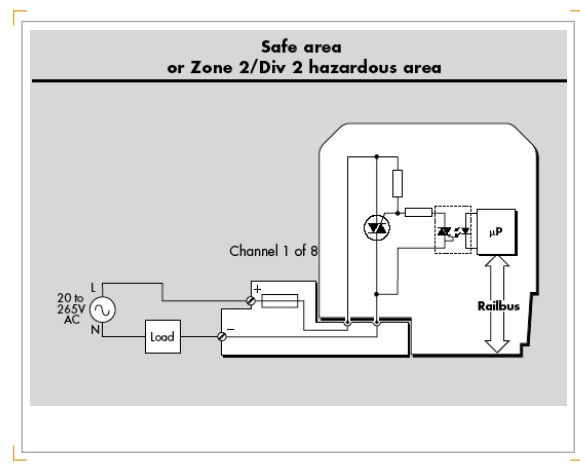
Output initialization state.....	predefined value
Fail-safe.....	predefined value/last value
Output	discrete, momentary or continuous pulse‡
Pulse width.....	2 ms to 130 s

Response Time

Response time (max.) ..2 ms + 11/42 cycle of mains frequency
(From Railbus command to output change)

Power Supplies

Railbus (12V) current.....	75 mA (typ.)
.....	125 mA (max.)
Bussed Field Power	not required



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8-channel Discrete Output

20-265 V ac, isolated, unpowered



NovaTech 8000 Series I/O Family

Mechanical

Module Key Code	F4
Module width	42 mm
Weight.....	220 g

Field Terminals

Field Wiring	Recommended Field Terminal	Compatible Field Terminal
General Purpose	NT-8604-FT-FU Fused	NT-8602-FT-ST Standard
Class 1, Div 2 or Zone 2 hazard- ous area	NT-8611-FT-FU Non-arcing, Fused	NT-8610-FT-NA Non-arcing

† Stated figures are for operation with unfused field terminal.
When operating with 2 A fused field terminal part no. NT-8604-FT-FU, maximum switched current is 5 A inrush for <10 ms pulse width at 0.1% duty cycle and <10⁸ operations.

* Limited to 3 A per module.

‡Consult NovaTech for availability

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